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CONTENTS

O'Byrne—On the Effectiveness of Protective Adaptations (Lepid.) . . 57
Hebard—Notes on Colorado Orthoptera 61
Cresson—Descriptions of New Species of the Dipterous Family Ephydridae 65
Leussler—Atrytone bimacula ♀ aberration contradicta, aber. nov. (Lepid.: Hesperiidae) 71
Curator of Insects at Boston 71
Haskin—Thecla halesus, its Life cycle and Habits (Lepid.: Lycaenidae) 72
Hubbell—A Change of Name in the Genus Melanoplus (Orth., Acrididae, Cyrtacanthacrinae) 74
Hicks—Observations on Dianthidium ulkei (Cresson). (Hymenoptera: Megachilidae) 75
Wickwire and Calale—Observations in the Genus Samia (Lepidoptera: Saturniidae) 79
Headstrom—The Winter Stage of Sibine stimulea (Lepid.: Eucleidae) 80
Entomological Literature 81
Review—Blatchley's In Days Agone 84
Obituary—Edward Bruce Williamson 84
~~Title-page and Index to Volume XLIII.~~

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ENTOMOLOGICAL NEWS

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On the Effectiveness of Protective Adaptations (Lepidoptera).

By HAROLD O'BYRNE, Webster Groves, Missouri.

The theories concerning the various aspects of the subject of protective adaptation have received a vigorous attack at the hands of Mr. W. L. McAtee ('32), who has amassed an immense quantity of data on the food of birds, based on examinations of the contents of their stomachs. The great value of so many definite records cannot be denied, but his interpretation of the result of his investigation is open to serious question.

Mr. McAtee obtains the following result from his tabulations: that the number of identifications in each of the various taxonomic groups bears a general relation to the frequency with which the animals belonging to those groups occur in nature. I agree with him as to the higher groups—phyla, classes, and orders; and, in general, families also, although there are some important exceptions. His classification of data does not consider categories smaller than families, so any conclusions that can be drawn regarding the effectiveness of protective adaptations cannot apply to adaptations that involve smaller units. His method is thus limited in its application. Having arrived at this result, he goes on to mention many instances where birds have eaten supposedly "protected" species, and comes to the conclusion that protective adaptations are of little or no effectiveness in influencing birds in their selection of food, and that the theories regarding protective adaptations are inadequate to explain them. I do not think that the results of his investigation warrant such a conclusion.

In the first place, he has concentrated his attack upon the types of protective adaptation that have been least substantiated and are still disputed—disagreeable tastes and odors, and warning coloration—while he glosses over the much more important one, concealing coloration. If he had given this last as full

consideration as he did the others, it would lead to conclusions exactly opposite. For if birds consume as many cryptically colored animals, in proportion to their abundance, as they do conspicuously colored ones, then they are evidently seeking the former in preference to the more easily found conspicuous animals. This would indicate that the latter are less suitable for food, and is therefore favorable to the adaptation theories.

My second objection to Mr. McAtee's conclusions is that his method does not take into consideration the circumstances under which the food of birds is obtained. For example, butterflies and many grasshoppers, while in flight, are among the most conspicuous of all insects. We should, therefore, expect them to be eaten by birds in greater proportion than many other insects. Mr. McAtee finds that this is not the case; it seems reasonable to believe, therefore, that their concealing coloration while at rest is the compensating factor. Again, most insects, after they have completed the task of reproduction, become more sluggish and less successful in hiding themselves—effects of "old age." Birds should be expected to devour a larger proportion of such relatively more available prey. If protective adaptations help to preserve their lives until this time, its purpose is accomplished, even though they are eventually eaten by birds. It is therefore absolutely necessary to know the circumstances of capture in order to judge the effectiveness of protective adaptations.

My third criticism is that Mr. McAtee has failed to take into account all of the factors involved in the balance of nature. The number of progeny of a pair of animals that survive to reproduce their kind is dependent upon their fecundity, upon the survival of the offspring under optimum conditions, upon the effectiveness of all of their protective adaptations, and opposed to these, upon the toll taken by the environment (the "resistance of the environment"—see Chapman, '31, chap. viii), including their destruction by all predaceous enemies. Mr. McAtee has considered only a fraction of the resistance of the environment. Determination of the effect of protective adaptations must await the evaluation of the other factors. The destruction of animals by predaceous foes may be taken as

the resultant of two factors, the defensive adaptations of the animals preyed upon—in structure, color, and behavior—and the aggressive adaptations of the attacking animals. The development of these has been not unlike that of human methods of warfare, where each improvement in defensive fortification has been met by an increase in the effectiveness of weapons of attack. In like manner, the development of protective adaptations in animals preyed upon has been accompanied by improved adaptations for aggression in predators. The *status quo* has been maintained; forms unable to keep up with the procession have been left by the wayside for the paleontologists to ponder over. Discussion of the effectiveness of protective adaptations will accomplish little unless we consider their development along with that of the corresponding aggressive adaptations of predaceous animals.

For these reasons I believe that Mr. McAtee has failed to prove his case. Furthermore, his discussion of many of the examples that he cites in support of his contention are misleading; I shall comment upon a few that refer to the Lepidoptera, as I am familiar with that order.

Referring to the larvae of Geometridae which are supposed to be protected through their resemblance to twigs, he says (p. 58) that "such a defense depends upon immobility whereas these caterpillars must be in motion the greater part of the time while searching for and devouring food." My observation of geometrid larvae has shown them to be generally slow of movement, except when disturbed, and they are often motionless for considerable lengths of time. It would be interesting in this connection to determine how many of them are nocturnal feeders and rest in the daytime when most birds are active.

Mr. McAtee lists 113 records of birds eating Rhopalocera, of which 24 are larvae and 2 pupae. Of the remaining 87 which deal with adults, not one refers to the best known North American example of supposed "protected models" in mimicry, *Danais plexippus* Linn. Although this abundant species is one of our most conspicuous butterflies, and is everywhere avail-

able to birds, not a single one of the 80,000 birds examined had eaten one.

Then he says (p. 59) that there are two records for *Papilio* species and six for *Vanessa* species, "supposedly the best protected forms." I do not believe that such a claim has been made for the entire genus *Papilio;* one group of them are regarded as being "protected," the "pharmacophagous" group (Punnett, '15), of which *P. philenor* Linn. and two or three stragglers into the southern part of the country are the only representatives north of Mexico. He does not say what species were found. As to *Vanessa,* his application of the name is confusing; but their "protected" qualities are doubtful and have always been disputed. All of the species known to me, that belong to the closely related genera variously called *Vanessa, Aglais, Pyrameis,* etc., by different authors, are protectively colored on the lower surface of the wings.

Mr. McAtee dismisses the supposed difficulty of making identifications of Lepidoptera in bird stomachs by describing the fuzzy appearance of the material due to the presence in it of lepidopterous scales, and he says, further, that identifications can often be made from wing venation in cases where none of the original coloration remains. I wonder how often birds devour butterflies and moths, wings and all, as compared to the frequency with which they pull the wings off and eat only the body. When they do not eat the wings, the difficulty of making determinations would be greatly increased, and in many cases identification would be impossible.

Conclusion. Mr. McAtee's conclusion that protective adaptations are not effective does not necessarily follow from the result he obtains from his analysis of the contents of bird stomachs. That the food of birds is generally distributed among the taxonomic groups in proportion to the abundance of individuals and their availability to birds only shows that the majority of animals possess some kind of protective adaptation. Mr. McAtee's argument is faulty because he selects for his attack only certain adaptations and does not consider the others. However, he is entirely right in subjecting the

theories on protective adaptation to more critical investigation than they have received heretofore. This cannot be denied, whatever the merits of his conclusions.

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Notes on Colorado Orthoptera.

By MORGAN HEBARD, Philadelphia, Penna.

Our revisionary studies on the Great Plains Orthopteran fauna have steadily progressed since we published on the Orthoptera of Colorado in 1929. A few nomenclatorial changes have been made and these, with several records of particular interest we note below, while a small but interesting series of the species taken in the vicinity of Boulder by F. B. Isely in 1931 is listed.

ARENIVAGA ERRATICA Rehn. Cortez, V, 19, 1925, 1 ♀. Durango was the only previous record of this southwestern cockroach from the state.

YERSINIOPS SOLITARIUM (Scudder). This genus was proposed by Hebard in 1931.[1] The species was previously referred to *Yersinia* Saussure, that genus now restricted to a single very distinct Mexican species.

PARATETTIX CUCULLATUS (Burmeister). We have recently noted, in discussing the Cucullatus Group, that there are no recognizable races of this species and that, though best considered distinct from *mexicanus* (Saussure), it shows definite divergence toward that insect in the southwestern portion of its range.[2]

PARATETTIX MEXICANUS EXTENSUS Morse. In discussing the Cucullatus Group we also found that *toltecus* (Saussure) is a synonym of *mexicanus mexicanus* (Saussure) but that the insect which had hitherto been recognized as *toltecus* represents a race for which the oldest name available is *extensus*.

[1] Trans. Amer. Ent. Soc., LVII, p. 114.
[2] Trans. Amer. Ent. Soc., LVIII, p. 223.

SYRBULA FUSCOVITTATA Thomas. Texas Creek, IX, 18 and 19, 1919, (R. C. Shannon), 1 ♂. Canyon City was the only previous Colorado record for this southern species.

ARPHIA CONSPERSA Scudder. In 1931 [3] we placed *Arphia frigida* Scudder as a synonym of *conspersa*. Though typically the northern and mountain dwelling insect appears distinct from that of the Great Plains, very large series which we have studied show such gradual transition from one to the other that we do not believe they can be distinguished as races.

MELANOPLUS BOREALIS STUPEFECTUS (Scudder). From examination of the entire original series we find that the type (a male selected by us in 1929, from Taos Peak, New Mexico) correctly represents a race of *borealis* from the Rockies of southern Colorado and northern New Mexico, but that the females so described are all referable to *M. dodgei bohemani* (Stål), an insect which was not described until two years later (1878), but specimens of which Scudder also recorded in 1876 incorrectly as *Pezotettix marshalli*.

MELANOPLUS PACKARDI Scudder. Although *M. foedus* Scudder is not a synonym of *packardi* as indicated by us and generally believed in 1929, our records of *packardi* then given are probably correct.

In a series of eighty-four specimens now before us the caudal tibiae are pink in half, blue in half. These were taken May 23 to October 29 and are from Julesburg, Ft. Morgan, Greeley, Ft. Collins, Boulder, Denver, Poudre River, Pingree Park at 9000 feet, Pine Grove, Colorado Springs, La Junta and Canyon City.

MELANOPLUS FOEDUS FOEDUS Scudder. Julesburg, VII, 29, 1910, (Rehn and Hebard), 1 ♂, 5 ♀. Greeley, 3 ♂, 1 ♀. Denver, (Stoner), 1 ♀; VII, 30, 1895, 1 ♂; VII, 20, 1897, 1 ♂. Lamar, VII, 18, 1901, 1 ♂. La Junta, IX, 1, 1909, (Rehn and Hebard), 1 ♂, 1 ♀. Grand Junction, 1 ♂.

Though also very common in eastern Colorado, this insect is apparently confined to the river flats where it is particularly numerous in high weedy areas, whereas *packardi* is generally distributed over the plains and also occurs in the foothills. In western Colorado *foedus foedus* is less abundant, while *packardi* is there probably extremely local.

In Colorado this insect has the median pronotal dark band weak or obsolete, the general coloration is more uniform and yellowish than that of the majority of specimens of *packardi*

[3] Proc. Acad. Nat. Sci. Phila., LXXXIII, p. 147.

and all we have seen have the caudal tibiae pink. These features do not aid in distinguishing specimens of *foedus foedus* from those of *packardi,* however, in other portions of their distribution.

MELANOPLUS FOEDUS FLUVIATILIS Bruner. This insect was reduced to racial status by us in 1931,[4] when we stated that it quite possibly represents merely a local environmental adaptation of *foedus foedus.*

SCUDDERIA sps. The grounds given by Caudell for using *Phaneroptera* in place of *Scudderia,* which we accepted in 1929 for American species, have been found untenable. Under *Scudderia* must therefore be assigned *texensis* Saussure and Pictet and *furcata furcifera* Scudder.

MICROCENTRUM RHOMBIFOLIUM (Saussure). Grand Junction, IX, 1, 1931, 1 ♀. This record extends the known range of the species considerably northward, as it was previously known in Colorado only from Cedar Edge.

STEIROXYS TRILINEATUS (Thomas). Cerro Summit, Montrose County, VIII, 21, 1896, (C. P. Gillette), 1 ♀. Wills Ranch is the only previously known Colorado record.

STENOPELMATUS FUSCUS (Haldeman). Redland Mesa, near Grand Junction, VII, 1922, (W. Yetter, under rock), 1 ♂. Grand Junction, X, 1926, 1 ♀. Though the species had been recorded from Colorado only from Cedar, it probably occurs throughout the state except at high elevations.

The following small collection was made by F. B. Isely in the vicinity of Boulder from July 27 to August 14, 1931, in plains, foothills and mountain environment.

No. 1. Roggen, Weld Country, 5000 feet, in sand hills.

No. 2. Boulder, Boulder County, 5300 feet, and nearby foothills up to 6300 feet.

No. 3. Nederland and Rainbow Lakes, Boulder County, 8200 to 11000 feet.

DIAPHEROMERA VELIEI VELIEI Walsh 2 ♂, No. 1. We discussed and placed as a southern race of this species Caudell's *mesillana* in 1931.[5]

MERMIRIA MACULIPENNIS MACCLUNGI Rehn 1 ♂. No. 1.

OPEIA OBSCURA (Thomas) 1 ♂, 1 ♀, No. 1 and No. 2.

AMPHITORNUS COLORADUS (Thomas) 2 ♂, 4 ♀, No. 2.

CORDILLACRIS OCCIPITALIS OCCIPITALIS (Thomas) 1 ♂, 1 ♀, No. 2.

CHORTHIPPUS CURTIPENNIS (Harris) 6 ♂, 1 ♀, No. 2 and No. 3.

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[4] Proc. Acad. Nat. Sci. Phila., LXXXIII, p. 187.

[5] ENT. NEWS, XLII, p. 65.

NEOPODISMOPSIS ABDOMINALIS (Thomas) 1 ♂, No. 3. This genus was erected in 1932 by Bei-Bienko [6] to include this single nearctic species.

GOMPHOCERUS CLAVATUS (Thomas) 1 ♂, No. 3.

AGENEOTETTIX DEORUM (Scudder) 2 ♂, 2 ♀, No. 2.

ARPHIA PSEUDONIETANA (Thomas) 3 ♂, No. 2.

CAMNULA PELLUCIDA Scudder 2 ♂, 2 ♀, No. 3.

DISSOSTEIRA CAROLINA (Linnaeus) 2 ♀, No. 2.

SPHARAGEMON EQUALE (Say) 2 ♂, 1 ♀, No. 2.

TRACHYRHACHIS KIOWA KIOWA (Thomas) 1 ♂, 4 ♀, No. 1.

TRIMEROTROPIS PALLIDIPENNIS PALLIDIPENNIS (Burmeister) 1 ♀, No. 1.

TRIMEROTROPIS CAMPESTRIS McNeill 2 ♀, No. 3.

TRIMEROTROPIS HUMILIS (Morse) 2 ♂, 1 ♀, No. 3, (at 8200 feet). Though revisionary studies will probably split up the genus *Trimerotropis* as at present understood, further studies of this and allied species prove that they should be assigned there at least for the present. Certainly *humilis* superficially strongly resembles *Spharagemon equale* (Say) in certain of the localities where it occurs, but we are convinced that the two species are derived from distinct phyla. The relationship to the Mexican *Trimerotropis tolteca* Saussure is very much closer than some series would suggest and extreme geographic variation appears to occur in each.

TRIMEROTROPIS AGRESTIS McNeill 1 ♂, 2 ♀, No. 1.

CIRCOTETTIX RABULA RABULA Rehn and Hebard 1 ♀, No. 3.

PAROPOMALA WYOMINGENSIS (Thomas) 2 ♂, 2 ♀, No. 1.

SCHISTOCERA LINEATA Scudder 1 ♂, No. 1.

HESPEROTETTIX VIRIDIS VIRIDIS (Thomas) 1 ♂ (decidedly recessive), No. 1. Further studies of enormous series have convinced us that *gillettei* Bruner is a synonym of *nevadensis* Morse and the *nevadensis* and *pratensis* must both be placed as races of *viridis*.[7]

HESPEROTETTIX SPECIOSUS (Scudder) 2 ♂, No. 1.

MELANOPLUS DIFFERENTIALIS (Thomas) 1 ♂, No. 1.

MELANOPLUS BIVITTATUS (Say) 1 ♂, No. 1.

MELANOPLUS DAWSONI (Scudder) 2 ♂, 2 ♀, No. 3.

MELANOPLUS FEMUR-RUBRUM FEMUR-RUBRUM (DeGeer) 4 ♂ (2 from No. 1 large and pale, 2 from No. 2 small).

MELANOPLUS INFANTILIS Scudder 1 ♂, No. 3.

MELANOPLUS LAKINUS (Scudder) 1 ♀, No. 2.

MELANOPLUS MEXICANUS MEXICANUS (Saussure) 4 ♂, 2 ♀, No. 3.

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[6] Eos, VIII, p. 56.

[7] Proc. Acad. Nat. Sci. Phila., LXXXII, p. 392, (1930).

MELANOPLUS FOEDUS FOEDUS Scudder, 1 ♂, No. 1.
MELANOPLUS ANGUSTIPENNIS (Dodge) 2 ♀, 2 ♀, No. 1 and No. 2.
MELANOPLUS FLAVIDUS FLAVIDUS Scudder 3 ♂, No. 1.
MELANOPLUS BOWDITCHI BOWDITCHI Ssudder 1 ♀, No. 1.
PHOETALIOTES NEBRASCENSIS (Thomas) 1 ♀, No. 3.
ORCHELIMUM CONCINNUM DELICATUM Bruner 2 ♂, 2 ♀, No. 1.
CONOCEPHALUS FASCIATUS FASCIATUS (DeGeer) 4 ♂, 4 ♀, No. 1 and No. 2.
CONOCEPHALUS STRICTUS (Scudder) 1 ♀, 1 ♂, No. 2.
CONOCEPHALUS SALTANS (Scudder) 1 ♂, 1 ♀, No. 2.

Descriptions of New Species of the Dipterous Family Ephydridae.

By EZRA T. CRESSON, JR., Philadelphia, Penna.

Paralimna piger new species.

The facial markings of this species suggest those of *punticornis* Cress. but here we have no flattened area on the second antennal segment.

Head scarcely broader than high; eyes round. Frons distinctly broader than long; chocolate brown with ochreous lineation; ocellar bristles almost aligned with anterior ocellus; profile, convex. Face almost as broad as long; profile slightly humped above line of upper bristles; median transverse sulcation not noticeable; ochreous gray, heavily discolored with chocolate brown, especially between antennae on the hump, as two median vertical stripes and on facialia, leaving the foveae, parafacies and oral margin, ochreous gray. Two subequal bristles each side as strong as frontorbitals; the uppermost above line of buccal orbit, with about five fine bristles below. Cheeks one-fourth height of head; medianly brown, leaving orbits and oral margin, grayish. Antenna above center-line of eyes, separated by about width of third segment; second normal; third twice as long as broad, arista with ten hairs. Tormae sericeous white.

Mesonotum chocolate brown with grayish longitudinal lineation, becoming more gray and irrorated laterally. Mesopleura for most part brown, becoming irrorated medianly; pleura otherwise grayish, scutellum almost uniformly brown except laterally. Brown bands of abdomen broader than the ochreous gray ones with distal margins sharp and scarcely recurved mesally; median stripe sharply defined and rather broad to apex of abdomen. Ventral lobes gray, irrorated; those of basal segments more discolored.

Legs slightly grayish; bases of all tarsi tawny, especially of hind pair. Fore femora of male with anterior flexor ciliation of about ten apically curved slightly flattened bristles confined to the medial three-fourths; the longest, proximally, about three-fourths diameter of femora. Post-flexor ciliation confined to basal-half, of about five very long bristles equalling diameter of femora. Flexor surfaces not noticeably sulcate. Fore tibiae slightly bowed. Wings elongate, slightly obscured; veins brown; crossveins blackened; second costal section slightly more than twice as long as third: second of fourth vein slightly more than length of third. Length, 3.3 mm.

Type.— ♂ ; ECUADOR. (H. H. Parish; 1914). [U. S. N. M., no. 44805].

Paratype.—1 ♂ ; topotypical. Smaller than type (2.7 mm.) and not in as good condition, but apparently similar otherwise.

Paralimna luctans new species.

Were it not for the silvery spot on the second antennal segment, I would strongly suspect this to be *bistriata* Hendel or *cilifera* Hendel from the Bolivian-Argentina region.

The frons is much broader than long, dark brown to blackish, with some ochreous lineation above lateral and ocellar bristles; frontorbitals slightly in advance of line of frontals. Fronto-facial profile evenly convex. Face about as broad as long with slight interfoveal hump, grayish but much discolored with ochre and brown especially above; the two submedial longitudinal marks more or less evident; the median transverse sulcation very evident in certain aspects and runs obliquely into the facialia laterally. Upper facial bristles about as strong as the anterior frontorbital, and are slightly above line of buccal orbit, with about five hairs below. Cheeks whitish, about three-fourths diameter of eye. Antennae above center-line of eyes, black, dark pilose; second segment with distinct silvery spot above; arista with about eleven hairs.

Mesonotum ochraceous with irrorations and suggestion of three interdorsocentral brown lines. (Lateral margins and mesopleura stained and markings not discernible; pleura otherwise whitish). Scutellum broad as long, grayish, darker basally. Abdomen with a continuous median brown stripe, broadest on third segment; basal brown segmental bands with convex margins, attenuating laterally, not extended over onto ventral lobes; mesal portion of ventral lobes of second and third segments brown.

Femora grayish; basal segment of fore, two or three of

middle and hind, tarsi, tawny. Fore femoral ciliation of male composed of slightly flattened, pointed, not apically curved bristles which are nearly as long as diameter of femora at about middle of series which runs to minute hairs before distal extremity; their tibiae are normal. Wings rather noticeably brown tinged. Second costal section more than twice as long as third; posterior crossvein somewhat blackened but not noticeably clouded. Length, 4 mm.

Type.— ♂ ; Posadas, Misiones, ARGENTINA. January 13-15, 1927. (F. & M. Edwards). [British Mus. N. H. Coll.].

Paratype.—1 ♀ ; topotypical.

Paralimna sera new species.

This species may be distinguished by the blackish upper portion of the face which is concolorous with the anterior part of the frons.

Frons almost quadrate, convex in profile, dark brown to black with obscure grayish lineation; ocellar triangle attenuated and attaining anterior margin. Face broad as long, prominent in profile with little or no median hump and no median transverse sulcation; bluish gray with upper portion except parafacies blackish; uppermost bristle long and slender, aligned with buccal orbit, with about two shorter hair-like bristles below. Cheeks one-half diameter of eye. Antennae about on center-line of eye; second segment normal; third, twice as long as broad; arista with eight hairs, somewhat curving at tips. Tormae sericeous white.

Mesonotum dark golden brown with gray dashes suggesting vittation; irrorations absent except on the lateral gray areas. Scutellum concolorous, gray laterally. Mesopleura brown above and below without irroration; pleura otherwise whitish gray. Abdomen elongate; basal one-half to three-fourths of segments two to five, broadly produced to apices medianly (forming a broad median stripe) and narrow apical margins, opaque brown, leaving a narrow, medianly interrupted subapical gray fascia on these segments.

Legs grayish; one or two basal segments, pale. Fore femora of male beneath with anterior flexor series of rather short, flattened, slightly curved bristles mostly confined to distal half; posterior series normal, confined to basal half. Wings brownish, crossveins not noticeably darker. Length, 4.5 mm.

Type.— ♂ ; Yallahs Valley, Blue Mountains, JAMAICA. February 24, 1911. [Am. Mus. N. H.].

Paratype.—1 ♂ ; topotypical.

Nostima scutellaris new species.

Very similar to *N. picta* which also occurs in the western United States; differing in the entire yellow legs, more shining mesonotum and opaque, black frons.

Black; third antennal segment below, palpi, legs including fore coxae excepting apices of tarsi, yellow. Halteres whitish. Wings immaculate, yellowish hyaline, irridescent, with pale veins.

Opaque; frons velvety black with narrow silvery orbits; face pale yellow in male, white in female, with narrow silvery orbits; cheeks white. Mesonotum subopaque to shining, with broad medial stripe dusted anteriorly with brown, limited laterally at dorsocentral lines by conspicuous whitish lines which become broader posteriorly occupying nearly entire lateral part of mesonotum, this dilation varying according to aspect, but always most persistent anteriorly; these lines continue to an intense white spot at lateral angles of scutellum. Scutellum and posterior medial margin of mesonotum, velvety black. Pleura black above, white below, the line of demarkation very sharp; metanotum grayish. Abdomen polished with a brown pollinose basal medial area.

Structurally similar to *picta* Fallen.

Type.— ♂ ; Michigan City, INDIANA, June 29, 1915. (J. M. Aldrich). [U. S. N. M., no. 44806].

Paratypes.—1 ♂, 4 ♀ ; topotypical. 1 ♂ ; Lafayette, Indiana, June 17, 1915. (J. M. Aldrich). 1 ♀ ; same locality, and collector, June 11, 1915. Sweeping from grass. 1 ♀ ; same locality and collector, March 30, sweeping over grass. 1 ♀ ; same locality and collector, May 30, 1916. 1 ♀ ; Vincennes, Indiana, (J. M. Aldrich). 1 ♀ ; Peoria, ILLINOIS, May 20, 1918, (J. M. Aldrich). 1 ♀ ; same locality and collector, August 26, 1917. [all U. S. N. M.].

Napaea vanduzeei new species.

This species seems to be closely allied to *pinguis*, which species however has a glistening white face, sharp abdominal margins and less strongly marked wings.

Black; halteres pale yellow; tarsi brown to tawny. Somewhat shining; sparingly dusted with brown except on abdomen where it is whitish. Frontal vittae rather more shining, but not conspicuously so. Structurally similar to *N. pinguis* (Walker). Face yellowish white, not glistening; rather straight,

slightly oblique in profile. Mesonotum with one to two post-dorsocentrals discernible; scutellum as broad as long, triangular, with distinct apical conical tubercle; distance between the apical bristles about one-half their length. Abdomen uniformly bluish tinge and whitish pruinose; lateral margins revolute but scarcely turned under. Wings strongly tinged with brown; crossveins broadly clouded and distal portions of second, third and fourth veins narrowly clouded; whitish areas proximad and distad of anterior crossvein and the three or four near the posterior one, well marked. (Type shows a very short appendage near tip of second vein, also a crossvein between second and third before curve of second); second costal section at most twice as long as third; last two sections of fourth subequal. Length, 3.5 mm.

Type.—♀; Niagara Falls, NEW YORK. July 21, 1913. (M. C. VanDuzee). [A. N. S. P., no. 6497].

Paratype.—2 ♂; East Aurora, New York. July 28, 1912. (M. C. VanDuzee). [These specimens do not show any distinct appendage or crossvein as in type, but one has a crossvein near tip of second to costa in both wings.]

Scatella troi new species.

A species similar to *stagnalis* Fallen, but larger, with gray face and abdomen, and strong lateral basal scutellar bristle.

Black; halteres knob pale yellow, pedicle brownish. Opaque to subopaque; medifrons, mesonotum and scutellum somewhat shining. Dusting of frons, thorax and scutellum above, golden ochreous or brown, becoming grayish below; that of face, metanotum and abdomen plumbaceous. Wings infuscated with four somewhat indistinct but large diluted spots: one in middle of submarginal cell, one sub-basal and one distomedian in first posterior, and one subapical in discal cell.

Structurally similar to *stagnalis* Fall. Face with three to four subequal, stout, dorsoclinate bristles in lower part of lateral series which are noticebly different from the two to three smaller lateroclinate bristles in upper part of the series. Cheeks much broader than width of third antennal segment. Antesutural dorsocentrals wanting or hairlike; postacrosticals absent, but presutural pair strong. Scutellum with strong lateral basal bristle besides the usual curved seta near apex. Abdomen elongate, scarcely as broad as thorax; fifth segment truncate, as long as third and fourth together. Wings very long, with second vein slightly curving into costa. Length, 3.5 mm.

Female sex unknown.

Type.— ♂ ; Troy, IDAHO. May 31, 1908. (E. T. Cresson, Jr.) [A. N. S. P., no. 6498].

Paratypes.—2 ♂ ; Husum, WASHINGTON, June 28, 1917, (A. L. Melander), [Coll. Melander]. 3 ♂ ; Clarkston, Washington, March 8, 1908, [Coll. Melander]. 1 ♂ ; Kendrick, Idaho. June 7, 1917, [Coll. Melander].

Scatella laxa new species

A species structurally similar to *stagnalis*, but larger, more shining, with white to gray face.

Black, with halteres fulvous. Upper surfaces dark, somewhat shining, brown pollinose; face, cheeks, pectus, legs, and apical portion of abdominal segments faintly, white to gray. Medifrons differentiated from the small opaque frontalia. Antesutural dorsocentrals undeveloped; postsutural acrosticals absent, but sutural pair strong. Scutellum with a lateral downcurved hair near apical bristles. Wings infuscated, with four to five distinct diluted spots, that one in submarginal cell generally occupying full width of cell. Length, 2.2 mm.

Type.— ♂ ; Berkeley Hills, Alameda County, CALIFORNIA, April 11, 1908. (E. T. Cresson, Jr.). [A. N. S. P., No. 6499].

Paratypes.—3 ♂ , 9 ♀ ; topotypical.

Scutella quadrinotata new species.

In some respects similar to the western *laxa* just described, but the cheeks are broader and the wings with only four spots.

Color of the dusting on the frons and thorax above, golden to greenish gold, becoming grayish on the under surfaces; of the abdomen, more grayish green with distal margins of the segments noticeably whitish gray; of the face, densely bluish gray. Frons medianly nearly polished; mesonotum, scutellum and abdomen somewhat shining.

In structure similar to *stagnalis* but more robust, with broader cheeks which are at least equal to that of third antennal segment. Wings with only four well defined whitish spots; the one usually in the second posterior cell being absent. Length, 2 mm.

Type.— ♂ ; Colden, NEW YORK. August 3, 1913. (M. C. VanDuzee). [A. N. S. P., No. 6500.]

Paratypes.—2 ♂ , 3 ♀ ; topotypical with same date.

Atrytone bimacula ♀ aberration contradicta, aber. nov. (Lepid.: Hesperiidae).

By R. A. Leussler, Omaha, Nebraska.

While collecting in a moist meadow at Valley, Nebraska, on July 5, 1932, a locality which has yielded a few specimens of *Atrytone bimacula* (G&R) each summer for several years past, the writer took a female without spots.

The specimen is slightly above average in size, having an alar expanse of 40 mm. The entire upper surface is uniformly fuscous except for a few fulvous scales along costa of forewings, as is usual in normal females of this species. The fringes are whitish as in normal individuals. Head, thorax, palpi and antennae as in normal individuals.

Underside, differs from normal only in the absence of the usual two spots on primaries, in place of which there is a single faint, very narrow and rather indistinct vertical line 2 mm. in length.

While there is a difference of opinion among Lepidopterists regarding the propriety of naming aberrations, I deem it advisable to bestow a name upon the insect described above, and as the absence of the usual two spots on forewing contradicts the specific name *bimacula* I propose for this ♀ aberration the name *contradicta*.

Unspotted individuals of *Atrytone vestris* and *Thorybes pylades* have been described and named and for that reason I feel it is desirable to call attention to this unspotted *bimacula*.

Males of *bimacula* from this locality vary greatly in the amount of fulvous on primaries. In occasional specimens a considerable area surrounding the stigma is fulvous and the inner portion of secondaries overlaid with bronzy, giving them the appearance of a dwarfed *arpa* (Bdv. & Lec.). In others the fulvous is limited to a narrow strip below the stigma, suggesting the possibility of a tendency toward a uniformly fuscous insect.

Curator of Insects at Boston.

Mr. Richard Dow writes that he has been appointed to take care of the insects at the Boston Society of Natural History. He says: "I am only working part time, and the position is nominally temporary."

Thecla halesus, its Life cycle and Habits (Lepid.: Lycaenidae).

By J. R. HASKIN, Auburndale, Florida.

I have always been particularly interested in *halesus* since the day, twenty years or more ago, when I first saw it in the uplands of Arizona feeding on the fall-blooming *Bigelovia graveolens*. The books said it was supposed to breed on mistletoe, but I could see none of it on the sparse and stunted oaks in the vicinity.

It was not until 1932 that I had a real opportunity to study its life habits, and it was in Florida twenty-five hundred miles away that I again found it in April on the great fragrant clusters of Saw Palmetto, *Serenoa serrulata*. Several species of oak and quantities of mistletoe were in the neighborhood of Beirce's Woods between Lake Ariana and Lake Whistler.

On April 10 I took a badly worn female *halesus* on a flowering cluster of saw palmetto. It was placed in a breeding cage with sprigs of mistletoe and two kinds of oak.

April 11-12. Found 18 eggs on mistletoe and four on live oak, scattered singly. Under a low power glass these look like minute, bleached, beachworn Sea Urchin shells. Echinoidea. (When I was a boy in Maine, we called them oar eggs.) At the top of the egg the micropyle is depressed, the center a transparent green. Cross section about 1/40″ diameter.

April 18-19. Eggs all hatched. Of the four on live oak two died and two crawled into the mistletoe. I therefore decided to feed them on mistletoe. It is difficult to do this for the young, tender mistletoe dries up in a few hours, whether or not the twigs are kept in water. This necessitates transferring the tiny larvae each day to fresh leaves and they are so exactly the color of the mistletoe that it is hard to find some of them. In fact several were lost before I realized how painstaking a search was required to locate them. These larvae are pale greenish yellow with a dark spot on rump. They are hairy, the hair darker than the body. Body tapers from front to rear.

April 21. The larvae are now about one-eighth inch long, a bright leaf green in the sunlight with the hairs gleaming brightly. Some have a tiny spot on back of 2nd and 11th

segments. These young larvae eat the surface off the top of leaves leaving small transparent spots.

April 24. Cast skins for 2nd instar. Now a darker green with faint yellowish and light green stripes. A tiny diamond shaped mark on 2nd segment. Length three-thirty seconds of an inch, slug-shaped, tapering to rear.

April 28. Cast skins again. Solid green, hairy, skin and hair exactly resembling the surface of mistletoe leaf. The spot on 2nd segment is white, diamond-shaped with two tiny lines across it. The larva is slug-shaped, with an overhanging fluted curtain-like border that covers and conceals a very small, brown head and small legs. This curtain touching the leaf all around accentuates the slug-like appearance of the larva. It is very slow and sluggish in its movements. Size 10/32 x 3/32 inches.

May 1. Casting skins again. Darker green with traces of russet red, covered with minute whitish spots and slightly hairy. The diamond-shaped spot under a glass proved to be white with a fine black border and a pair of fine lines cutting it lengthwise. The small brown head is tucked under a cowl-like hood. So perfectly do they resemble the mistletoe leaf that at times they are hard to locate. They now are large enough to eat the whole leaf. Size 18/32 x 6/32 inches.

May 4. Becoming more slug-shaped than ever, the skin curiously roughened, the segments distinguishable.

May 8. Have grown to 1 x 10/32 inches, thick, slug-shaped, slow moving. The side fringe or curtain is very noticeable and covers feet and head. Faint, wavy lines of greenish on sides and back. Minute dots on sides of last 8 segments. Hairs are whitish. When drawn up resting they are 3/4 x 10/32 inches.

May 11. Have spun their girdles on green mistletoe leaves lying on edge on the bottom of the cage. One is on side of cage near leaves.

May 12. Have formed chrysalids of the Thecla type, abdomens much larger than thorax. In a general way they look like the illustration in Holland's *Butterfly Book*, Plate V, figure 26, and are almost the same size, being 10/16 of an inch long, with abdomen 6/16 inch wide and 10/16 inch high. The color is a rusty, mottled brown. Ridge of thorax has coarse

yellow bristles with a double row of clumps of the same on four segments of abdomen. On sides of 2nd segment are tiny spots which, under the glass, look like small black ears partly edged with white. The bottom of the chrysalis is flat and fits closely against its support.

May 28. Butterflies emerged, from this date to June 2. except one which may be dead or which may emerge in the fall.

In Florida *halesus* appears to breed over a considerable period. The only reason more are not seen is that they spend their days in trees and are to be taken only when attractive flowers bring them down within reach. I have taken occasional fresh specimens every month from September 12 to January 19, and all through April also when Palmetto was in bloom. I obtained numbers of eggs from confined females in April, October, and December. One taken in October laid 65 eggs singly and in clusters on mistletoe in two days. Another laid fifty-two in three days in December.

It seems to be rather long-lived for a butterfly. A fresh male taken January 19 was fed on sweetened water and lived forty days until February 28. Its wings gradually wore out and a couple of cold nights finally weakened it. As it grew used to captivity it actually seemed to display a certain intelligence for each day when I opened the cage to feed it with sugared water on a camel's hair brush, it would prick up its antennae and observe my movements alertly. As the brush approached it would unfold its proboscis and show very plainly that it understood what was coming to it.

A Change of Name in the Genus Melanoplus (Orth., Acrididae, Cyrtacanthacrinae)

In a recent paper on the Puer Group of the genus *Melanoplus* (Univ. Mich. Mus. Zool., Misc. Publ. 23, p. 56, 1932) I described a new species from the east coast of Florida under the name *Melanoplus insignis*. Unfortunately I overlooked the fact that *insignis* had already been used by Hebard (Proc. Acad. Nat. Sci. Phil., 1917, p. 266) for a Mexican race of *Melanoplus desultorius* Rehn. I therefore propose the new name *Melanoplus indicifer* to replace *Melanoplus insignis* Hubbell 1932 (not of Hebard 1917).

T. H. Hubbell, University of Florida, Gainesville, Florida.

Observations on Dianthidium ulkei (Cresson). (Hymenoptera: Megachilidae.)

By CHARLES H. HICKS, University of Colorado, Boulder, Colorado.

During the summer of 1932 the resin worker bee, *Dianthidium ulkei* (Cresson),* was found nesting at or near Owens Lake, a few miles east of Boulder, Colorado. The females were solitary in habit and usually built their nests in natural (?) cavities or short tunnels in the soil. The nests consisted of one or two cells, constructed of pebbles, sticks, stems or other suitable objects, cemented and held together by means of some resinous or gummy substance. The completed and provisioned cell or cells of a given nest were further protected to the outside by means of a number of pebbles and the like, carried by the female and placed in the open tunnel above. A somewhat detailed account of certain of the habits of this bee is given below.

On September 6 a female, *D. ulkei,* was first observed flying low and coming to rest on a dandelion leaf at 10:15 in the morning. After a brief pause, she flew to and into an entrance in the ground some 4 inches away. The nest tunnel was unusually short and the orifice situated at such an angle that at this time of day the rays of the sun reached within. It was therefore easy to see the bee as she entered head first, inspected the cell or deposited some nectar, backed out, turned about and backed into the cell. The latter action was to enable her to brush the collected pollen from her ventral scopa.

This bee was gone 23 minutes on a collecting trip and remained in the cell on her return a total time of one minute and 16 seconds in depositing her load. She was then caught for identification. The ends of her wings were worn and frayed, giving evidence of much use and wear previous to this time. She must have built and provisioned other nests prior to my arrival on the scene.

The nest was dug out and found to consist of two cells. One was complete and the space above it seemingly filled in

* The insects mentioned in this account have been determined by Dr. T. D. A. Cockerell.

with debris; the other was incomplete and but partially provisioned. The upper or anterior ends of these cells were close to the surface where they had been formed in an angle between two rocks. The unfinished cell was definitely and firmly attached to the surface of one stone but the other was apparently not attached at all.

Whether this bee selected a natural cavity in which to build her nest or whether she excavated a place in which to form her cells are questions difficult to answer from the facts at hand. It did seem, however, that some excavation must have taken place as the upper edges of the walls gave evidence of previous work. It is a rather widespread habit for the Anthidiine bees to select nesting holes formed by other insects and such a method is probably followed, at least in part, by *D. ulkei.*

The cells of this nest had been constructed of plant stems, dried leaves, seeds and other vegetable material, with an occasional pebble or hard piece of soil held together by a resinous material. Some of the stems were long and extended beyond the end of the cell proper. These extensions gave the cell somewhat the appearance of the larval cases of certain Caddis flies. The use of so much plant material in these cells may have been due in this instance to its abundance in the immediate area. Other cells, formed by the same species nesting where pebbles were abundant, contained more pebbles than sticks or stems.

The stems and sticks from one cell numbered 50 and varied from a few millimeters to 17 in length. The very anterior end of the cell or the cap was solely of clear resin. The entire length of the cell proper, not including the twigs or straws which extended beyond the anterior end, measured 14 mm. It was 12 mm. thick at the widest point, having a rounded base and narrow orifice or entrance 4 mm. in diameter. The inner surface of the cell was of smooth resin, apparently quite free from pebbles or sticks.

The pollen, in a completed cell, is quite moist and fills the lower two-thirds of the inner space. The egg of the bee is laid upon the top of this mass. It is clear, light in color, curved and apparently rests with each end touching the food below. A resin cap is later built across the opening above it, thus closing the entrance to the cell. If this cell then be opened, the

food content quickly loses its moisture in the dry atmosphere of Boulder, thus preventing the young bee larva from feeding, growing or developing. Special moist conditions must be secured for an opened cell to enable the insect to successfully reach maturity.

A nest finished at noon on September 12 and opened on the morning of September 14 contained a larva 3 mm. long, flat on the food mass, which had already begun feeding. A space of 4 mm. was empty above it and between it and the resin cap. The opened cell was enclosed at the laboratory within a celophane covering and sealed, but it dried out, nevertheless, and the larva lived a stunted life for a few days, after which it perished.

Another nest, taken on September 12, had an entrance tunnel formed at a slight angle, with walls smooth on the inside and a diameter measuring 6 mm. This tunnel opened into the side of a small mound of rather rocky soil, although others found elsewhere have sometimes been in soil nearly free from stones or gravel. The inner surface of the tunnel was smooth and appeared to have been pounded or worked on by an insect when the soil was moist. A few soil droppings at the orifice gave evidence of earlier work but whether it was done by this bee or another animal is a question.

This bee, at the time, was making periodical visits to a slope 18 feet away where she was selecting pebbles, twigs and the like, and carrying them to the nest. She was soon caught for identification and the cell dug out. A completed cell was found just below the surface and with one side attached to a rock. This cell had a distinct cup-shaped depression at the anterior end formed by the side walls some 4 mm. beyond the anterior cap of resin.

An interesting and important variation in nest site selection and nest building was met with on the afternoon of September 17, just outside the city limits of Boulder. This bee, much to my surprise, was found carrying and depositing pebbles loosely on the nearly flat surface of a rock. Certain bees of the genus *Anthidium* habitually fill in the upper tunnel above the cell of a nest with loose pebbles but all pebbles, previously observed used by bees of the genus *Dianthidium* and placed on rocks,

have been carefully or firmly held together with resin. The nearly flat surface of the rock arose at almost right angles near its center and into this area had been placed the pebbles and the one cell of the nest.

Removal of the nest material revealed the one cell, horizontal in position, fully provisioned and containing the large curved, clear egg of the bee at the slightly lower end. The pebbles immediately about the pollen and egg were loosely held together by resin; the remaining pebbles and sticks had but barely a trace of resin, here and there, among them. The total number of objects the bee had carried, at the time of her capture and hence probably not the absolute maximum, was 920. This consisted of 880 pebbles and 40 small sticks and stems. Thus the bee had journeyed to and from this rock some one thousand times in its building, provisioning and attempted concealment of the nest.

Still another variation of habit is evidenced from a record * of the species found nesting in an old cell of *Anthophora neomexicana* Ckll., near Boulder. The single cell was built mainly of clear resin, with possibly some soil or a little other material, and attached to the side and upper walls of the inside of the large mud cell of *A. neomexicana*. The cocoon was light brown and had a mammillary projection at the anterior end similar to that found on the cocoons of other species of the genus.

Dr. Cockerell has kindly given me the following data on specimens now in his collection: Boulder, Colorado, University Campus, July 15, T. D. A. Cockerell; Boulder, Colorado, July 17, W. P. Cockerell; on *Grindelia,* Boulder, Colorado August 9, W. P. Cockerell one specimen, T. D. A. Cockerell one specimen; on *Grindelia serrulata,* Boulder, Colorado, September 3, T. D. A. Cockerell; Boulder, Colorado, September 9, S. A. Rohwer; also Raton, N. Mex., fall; and Pecos, N. Mex., no date. These records, in addition to my own captures and date of observations point to a single generation a year and that a late summer or fall one, although our data may be insufficient to definitely determine this.

*Hicks, Charles H. Nesting Habits and Parasites of Certain Bees of Boulder County, Colorado. Univ. Colo. Studies. Vol. XV, No. 3. p. 250, 1926.

Observations in the Genus Samia (Lepidoptera: Saturniidae).

By HARRIET A. WICKWIRE and ADÈLE CALALE, Cortland, New York.

It is well known that moths of *Samia cecropia* will mate with moths of *Samia gloveri* when placed in cages, if mates of their own species are not present. However, we have never seen an account similar to an experiment which we tried one June night, so we submit our experience for what it may be worth.

On the night of June 4, 1932, two unmated females of *Samia gloveri* were put in a cage and taken into the woods near Venice Center, New York. The cage was set on the ground, several yards in front of the glaring headlights of our car. At 1.30 A. M. a male *Samia cecropia* moth appeared from the rear of the headlights, flying low. He crossed the lighted area and was caught as he hovered over the cage containing the female *gloveri* moths. Between 1.30 and 2 A. M., four *cecropia* males flew from the same direction as the first moth, to the caged *gloveri* females. When two of these males were introduced inside the cage with the *gloveri* moths, copulation occurred immediately.

On June 14, 1932, we "tied out" a newly-emerged female moth of *Samia gloveri* in our garden in Cortland, New York. The next morning we found this moth unmated, so the experiment was repeated the following night. The following morning the moth was found in copulation with a *Samia cecropia* male.

We consider that these cases prove that *Samia gloveri* is, as yet, not far enough removed from *cecropia* to have lost sexual attraction for the latter species.

At the time of the experiment there were many *cecropia* females in Central New York; yet the *gloveri* females, thousands of miles away from the boundaries of their habitat, lured the *cecropia* males away from their kind. This fact raises interesting speculations.

What would happen in a locality where both species were found? Would they interbreed freely?

Is there any such locality?

What was the original cause of differentiation between these two species?

Was it geographical only?

When did the separation occur?

For two years we have tried to rear hybrids of these two species, but have been unsuccessful. A mysterious disease started working rapidly on one or the other of the parent stocks. This disease infected all the larvae in the third stage. It brought weeks of work to naught. In our experience the hybrids have been the last to succumb. We believe this to be the disease which Eliot and Soule described in "Caterpillars and Their Moths," and which they considered especially fatal to *gloveri* larvae. The symptoms were those of diarrhea.

We will be grateful for any information which anyone can give us regarding the causes, prevention, or cures for this disease. Usually it has appeared after the first or second molt, and has proved most virulent among the Attacine group. *Tropaea luna* has never been affected by it, neither has *Automeris io* or *Telea polyphemus*.

The Winter Stage of Sibine stimulea (Lepid.: Eucleidae).

The larva of *Sibine stimulea*, popularly known as the Saddleback moth, because of a large green patch on the back of the larva, resembling a saddle-cloth, while the saddle is represented by an oval purplish brown spot, reaches full growth in late summer. It then spins a smooth dark brown ovoid cocoon in which it passes the winter.

To ascertain whether the larva passes the winter in the cocoon as larva or pupa, I gathered several specimens in September, 1931, which I found feeding on a pear tree. Being rather large, they required little feeding, and within a week had spun cocoons. In the latter part of the following April, I opened these cocoons, and in each case I found that the larva was still in the larval stage. This would seem to indicate that the larva hibernates in the cocoon during the winter. Furthermore, as the adults do not fly until June and July, it would also appear that the larva does not change into a pupa until the latter part of May or the first part of June.

Birger Richard Headstrom, Medford Hillside, Massachusetts.

Entomological Literature

COMPILED BY LAURA S. MACKEY UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The **figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of ENTOMOLOGICAL NEWS for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞*Note the change in the method of citing the bibliographical references, as* **explained above.**

Papers published in the Entomological News are not listed.

GENERAL.—Bishopp, F. C.—Mosquitoes kill live stock. [68] 77: 115-116. **Griffin, F. J.**—On the dates of publication of "Palisot de Beauvois, Insectes rec. Afr. Amér.," 1805-(1821). [75] 10: 585-586. **Hingston, R. W. C.**—Some smart insects. [Nat. Mag.] 21: 55-60, ill. **Holland, W. J.**—Reminiscences of a naturalist. [76] 1933: 191-192. **Jones, F. M.**—Insect coloration and the relative acceptability of insects to birds. [36] 80: 345-385, ill. **Melander, A. L.**—Fighting insects with powder and lead. [76] 1933: 168-172. **Strand, E.**—Nochmals: Nomenklatur und ethik. [Folia Zool. et Hydrobiol., Riga] 4: 103-133. **Strand, E.**—Nachtrag zu meinem artikel "Nochmals: Nomenklatur und Ethik." [Folia Zool. et Hydrobiol.] 4: 188-189. **Strand, E.**—Miscellanea nomenclatorica zoologica et palaeontologica. [Folia Zool. et Hydrobiol.] 4: 193-196.

ANATOMY, PHYSIOLOGY, ETC.—Beattie, M. V. F.—The physico-chemical factors of water in relation to mosquito breeding in Trinidad. [22] 23: 477-496, ill. **Cappe de Baillon, P.**—La bipartition monstrueuse du pronotum chez les Coléoptères. [24] 101: 245-266, ill. **Currie, G. A.**—Some notes on the biology and morphology of the immature stages of Harpobittacus tillyardi (Mecoptera). [Pro. Linn. Soc. N. S. W.] 57: 116-122, ill. **Hilton, W. A.**—Nervous system and sense organs. [13] 24: 64-66, ill. **Janisch, E.**—The influence of temperature on the life-history of insects. [36] 80: 137-168, ill. **Jobling, B.**—A revision of the structure of the head, mouth-part and salivary

glands of Glossina palpalis. [Parasit.] 24: 449-490, ill. **Kontkanen, P.**—On the larval digestive tract of Acanthocinus aedilis (Ceramb.). [Ann. Soc. Zool.-Bot. Fenn. Vanamo] 12: 91-106, ill. **Mer, G.**—The determination of the age of Anopheles by differences in the size of the common oviduct. [22] 23: 563-566, ill. **Miller, D.**—The buccopharyngeal mechanism of a blow-fly larva (Calliphora quadrimaculata). [Parasit.] 24: 491-499, ill. **Verlaine, L.**—L'instinct et l'intelligence chez les Hyménopteres. [Mem. Soc. R. Sci. Liége] 17, 13: 1-16.

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HYMENOPTERA.—**Borgmeier, T.**—Leptogenys crudelis Fr. Smith, 1858 (Formicidae). [105] 2: 485. ***Cockerell, T. D. A.**—Rocky Mountain bees. IV. [40] No. 595: 3 pp. ***Conde, O.**—Cimbicinen aus dem Museu Paulista (Tenthred.). [105] 2: 437-441, ill. ***Santschi, F.**—Quelques fourmis inédites de l'Amérique centrale et Cuba. [105] 2: 410-414, ill.

IN DAYS AGONE. Notes on the Fauna and Flora of Subtropical Florida in the Days When Most of Its Area was a Primeval Wilderness. By W. S. BLATCHLEY, Author of "The Coleoptera of Indiana," etc. The Nature Publishing Co., Indianapolis, 1932. 338 pp., 15 half-tone plates, chiefly of landscapes. $2.00, postage extra.—This book "deals mainly with the distribution and habits of the more interesting forms of plant and animal life which I saw during six trips made between the years 1911 and 1922 into extreme southern Florida. From the great mass of material in my field note books I have sorted out such facts of scientific interest as I thought would be of value and have brought them together in permanent form. Especially have I given the exact type locality and local habitat of many of the more than 200 new species of Coleoptera and 50 new species of Heteroptera which I have described from Florida. I mention also the stations and conditions under which many of the rare forms described by others may be taken."

The book is written in diary form and arranged under six chapters of unequal length: I Around the coasts of southern Florida—1911 (pp. 9-169), II The Okeechobee Wilderness—1913 (pp. 170-254), III Again the Okeechobee Wilderness—1918 (pp. 255-270), IV The Southern tip of the United States—1919 (pp. 271-297), V The lower west coast and Ten-thousand Islands—1921 (pp. 298-315), VI Okeechobee for the last time—1922 (pp. 316-331). Many an observation on plant and bird, fish and reptile, and not forgetting the human species, is met as one turns the pages. No one who has visited Florida, or any region with a similar biota, can fail to be interested by them. The insects which receive most attention are the Coleoptera, Heteroptera, Orthoptera and Lepidoptera; they are mentioned usually under their technical names and not infrequently brief descriptive notes enable the reader, who picks them up in the localities described, to identify them. Other aspects of nature are not neglected and we conceive that the volume may be very useful as a naturalist's guide. We wish, however, that it had a table of contents, a map and a fuller index, in which all the specific and generic names were entered. These additions would enable one to find again, much more quickly than can now be done, many a species whose identity is concealed under a family name in the index.—P. P. CALVERT.

OBITUARY.

With deep regret we record the death of EDWARD BRUCE WILLIAMSON, student of the Odonata, at Ann Arbor, Michigan, on February 28, 1933, as the result of a severe paralytic stroke on February 17.

EXCHANGES

This column is extended only for wants and exchanges, not for advertisements of goods and service for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—October, 1919, and December, 1919, copies of Bulletin of the Brooklyn Entomological Society. Cash. Harriet A. Wickwire, 55 Tompkins St., Cortland, N. Y.

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Wanted—Names and addresses of those desiring Insects from Tennessee. Will collect there during June-September, in all orders. Correspondence solicited. B. Benesh, 107 Argonne Drive, North Chicago, Ill.

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